



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RADIATION AND INDOOR AIR
National Air and Radiation Environmental Laboratory
540 South Morris Avenue, Montgomery, AL 36115-2601
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May 28, 2009

40314549

Superfund

MEMORANDUM



SUBJECT: Radiochemical Results for
Kansas Radium Dial Site Samples

FROM: John Griggs, Chief
Monitoring and Analytical Services Branch

TO: Randy Schademann, OSC
Region 7

Attached are data packages for isotopic uranium and thorium analysis of samples collected from the Kansas Radium Dial site in Wichita, KS. The samples constitute NAREL batch numbers 0900021 and 0900022. The results of further analyses will be sent as they are completed.

Radiochemical analyses usually require the subtraction of an instrument background measurement from a gross sample measurement. Both values are positive, but when the sample activity is low, random variations in the two measurements can cause the gross value to be less than the background, resulting in a measured activity less than zero. Although negative activities have no physical significance, they do have statistical significance, as for example in the evaluation of trends or the comparison of two groups of samples.

For all analyses except gamma spectroscopy, it is the policy of NAREL to report results as generated, whether positive, negative, or zero, together with the 2-sigma measurement uncertainty and a sample-specific estimate of the minimum detectable concentration (MDC). The activity, uncertainty, and MDC are given in the same units. The activity and 2-sigma uncertainty for a radionuclide measured by gamma spectroscopy are reported only if the nuclide is detected; so, the results of gamma analyses are never zero or negative. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226, and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected," or "ND," and provides a sample-specific estimate of the MDC.

Specific information concerning all aspects of the radiological analysis of the samples is contained in the batch case narratives of the data packages. If you have any questions concerning the analytical results, please contact me at (334)270-3450.

Attachments

cc: Robert Dye, Region 7, w/o attachments
Ron Fraass, NAREL

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
U ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #0900021

Project: Region 7 - Kansas Radium Dial Site, Wichita, KS
 Analysis Procedure: Actinides (Uranium) by Extraction Chromatography
 Report ID: 0900021-U
 Report Type: Original
 Date Reported: 05/27/2009
 Total Pages in Report: 27

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A9.02906E	650-SB-BG1 (2-3 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02907F	650-SB-BG2 (2-3 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02908G	650-SB-7-2 (0-1 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02909H	650-SB-10-1 (0-1 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02910A	650-SB-10-1 (1-2 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02911B	650-SB-13-1 (0-1 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02912C	650-SB-13-1 (1-2 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02913D	650-SB-13-2 (0-3.5 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02914E	650-SB-13-2 (3.5-4 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02915F	650-SB-13-3 (0-1 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02916G	650-SB-13-3 (1-2 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02917H	650-SB-13-3 (2-3 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02918J	650-SB-17-1 (0-3 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02919K	650-SB-17-1 (3-4 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02920C	650-SS-9-1	SAM	SOIL	03/26/2009	04/02/2009
A9.02921D	650-SS-12-1	SAM	SOIL	03/26/2009	04/02/2009
A9.02922E	650-SS-23-1	SAM	SOIL	03/26/2009	04/02/2009
A9.02923F	650-SS-24-1	SAM	SOIL	03/26/2009	04/02/2009
A9.02924G	650-SS-BGA	SAM	SOIL	03/26/2009	04/02/2009
A9.02925H	650-SS-BGB	SAM	SOIL	03/26/2009	04/02/2009

EXCEPTIONS

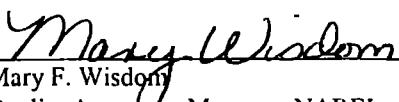
1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - Only samples A9.02906, A9.02907, A9.02913, A9.02916, A9.02921, A9.02924, and A9.02925 were analyzed for uranium as requested by the client. For samples A9.02913 and A9.02916, the aliquant size used for these samples was very small in anticipation of elevated analyte concentration. The concentration of uranium present in these samples, however, was not elevated as anticipated. In an effort to provide results with lower uncertainties, samples A9.02913 and A9.02916 were reanalyzed with larger aliquants. The results of the reanalysis of these samples are reported in this data package.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Yields - All chemical yields were within acceptance limits.
3. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

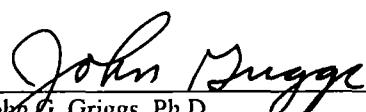
CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Director of the Center for Environmental Radioanalytical Laboratory Science and the NAREL Quality Assurance Manager, or their designees, as verified by the following signatures.



Mary F. Wisdom
Quality Assurance Manager, NAREL

5-28-09
Date



John G. Griggs, Ph.D.
Director, Center for Environmental Radioanalytical
Laboratory Science

5/28/09
Date

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Method blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A method blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #0900021

ANALYSIS SUMMARY

Analysis Procedure: NAREL U-EICHROM
Title: Actinides (Uranium) by Extraction Chromatography

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Assay Batch #	QC Batch #
A9.02906E		N/A	05/15/2009	0013258V	0005769H
A9.02906E	DUP	N/A	05/15/2009	0013258V	0005769H
A9.02907F		N/A	05/15/2009	0013258V	0005769H
A9.02913D		N/A	05/21/2009	0013275W	0005792G
A9.02913D	DUP	N/A	05/21/2009	0013275W	0005792G
A9.02916G		N/A	05/21/2009	0013275W	0005792G
A9.02921D		N/A	05/15/2009	0013258V	0005769H
A9.02924G		N/A	05/15/2009	0013258V	0005769H
A9.02925H		N/A	05/15/2009	0013258V	0005769H
LCS-00560089T *	LCS	N/A	05/15/2009	0013258V	0005769H
RBK-00560088R *	RBK	N/A	05/15/2009	0013258V	0005769H
LCS-00560984R *	LCS	N/A	05/21/2009	0013275W	0005792G
RBK-00560983Q *	RBK	N/A	05/21/2009	0013275W	0005792G

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

PREPARATION METHOD(S) USED

Procedure ID	Title

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SDG #0900021

SAMPLE ANALYSIS REPORT

Sample #:	A9.02906E	QC batch #:	0005769H
Matrix:	SOIL	Assay batch #:	0013258V
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.532e-01 GASH	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	82.52 %	Analyst:	PMT
Ash/dry weight:	95.20 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/14/2009 17:05	1000.0	AS02	DPG

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	MDC	Unit	Date
U234	7.22e-01	1.5e-01	4.7e-02	PCI/GDRY	05/14/2009
U235	5.46e-02	5.0e-02	5.7e-02	PCI/GDRY	05/14/2009
U238	7.85e-01	1.6e-01	5.2e-02	PCI/GDRY	05/14/2009

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SDG #0900021

SAMPLE ANALYSIS REPORT

Sample #:	A9.02906E	QC batch #:	0005769H
Matrix:	SOIL	Assay batch #:	0013258V
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.509e-01 GASH	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	82.52 %	Analyst:	PMT
Ash/dry weight:	95.20 %	QC type:	DUP
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/14/2009 17:05	1000.0	AS09	DPG

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	MDC	Unit	Date
U234	7.71e-01	1.6e-01	4.3e-02	PCI/GDRY	05/14/2009
U235	4.54e-02	4.5e-02	3.9e-02	PCI/GDRY	05/14/2009
U238	7.41e-01	1.6e-01	4.3e-02	PCI/GDRY	05/14/2009

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SDG #0900021

SAMPLE ANALYSIS REPORT

Sample #:	A9.02907F	QC batch #:	0005769H
Matrix:	SOIL	Assay batch #:	0013258V
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.537e-01 GASH	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	84.22 %	Analyst:	PMT
Ash/dry weight:	95.60 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/14/2009 17:05	1000.0	AS10	DPG

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	MDC	Unit	Date
U234	6.82e-01	1.5e-01	4.8e-02	PCI/GDRY	05/14/2009
U235	1.77e-02	3.7e-02	6.4e-02	PCI/GDRY	05/14/2009
U238	7.10e-01	1.5e-01	3.2e-02	PCI/GDRY	05/14/2009

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**SDG #0900021
SAMPLE ANALYSIS REPORT**

Sample #:	A9.02913D	QC batch #:	0005792G
Matrix:	SOIL	Assay batch #:	0013275W
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.014e-01 GASH	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	84.24 %	Analyst:	PMT
Ash/dry weight:	94.80 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/20/2009 17:04	1000.0	AS26	DPG

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
U234	1.01e+00	2.1e-01	4.4e-02	PCI/GDRY	05/20/2009
U235	3.37e-02	4.2e-02	5.3e-02	PCI/GDRY	05/20/2009
U238	9.91e-01	2.1e-01	3.3e-02	PCI/GDRY	05/20/2009

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SDG #0900021

SAMPLE ANALYSIS REPORT

Sample #:	A9.02913D	QC batch #:	0005792G
Matrix:	SOIL	Assay batch #:	0013275W
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.014e-01 GASH	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	84.24 %	Analyst:	PMT
Ash/dry weight:	94.80 %	QC type:	DUP
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/20/2009 17:04	1000.0	AS28	DPG

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	MDC	Unit	Date
U234	1.14e+00	2.2e-01	4.8e-02	PCI/GDRY	05/20/2009
U235	9.53e-02	6.1e-02	3.8e-02	PCI/GDRY	05/20/2009
U238	1.05e+00	2.1e-01	4.2e-02	PCI/GDRY	05/20/2009

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #0900021

SAMPLE ANALYSIS REPORT

Sample #:	A9.02916G	QC batch #:	0005792G
Matrix:	SOIL	Assay batch #:	0013275W
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.508e-01 GASH	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	82.50 %	Analyst:	PMT
Aslv/dry weight:	90.40 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/20/2009 17:04	1000.0	AS29	DPG

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	MDC	Unit	Date
U234	1.31e+00	2.2e-01	3.2e-02	PCI/GDRY	05/20/2009
U235	1.00e-01	5.5e-02	2.9e-02	PCI/GDRY	05/20/2009
U238	1.08e+00	1.9e-01	3.7e-02	PCI/GDRY	05/20/2009

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SDG #0900021

SAMPLE ANALYSIS REPORT

Sample #:	A9.02921D	QC batch #:	0005769H
Matrix:	SOIL	Assay batch #:	0013258V
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.545e-01 GASH	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	91.74 %	Analyst:	PMT
Ash/dry weight:	96.00 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/14/2009 17:05	1000.0	AS11	DPG

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	MDC	Unit	Date
U234	7.09e-01	1.6e-01	3.3e-02	PCI/GDRY	05/14/2009
U235	3.35e-02	4.2e-02	5.2e-02	PCI/GDRY	05/14/2009
U238	8.82e-01	1.8e-01	4.4e-02	PCI/GDRY	05/14/2009

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #0900021

SAMPLE ANALYSIS REPORT

Sample #:	A9.02924G	QC batch #:	0005769H
Matrix:	SOIL	Assay batch #:	0013258V
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.527e-01 GASH	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	86.84 %	Analyst:	PMT
Ash/dry weight:	91.60 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/14/2009 17:05	1000.0	AS24	DPG

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
U234	5.49e-01	1.3e-01	4.1e-02	PCI/GDRY	05/14/2009
U235	2.57e-02	3.5e-02	3.7e-02	PCI/GDRY	05/14/2009
U238	6.04e-01	1.4e-01	4.7e-02	PCI/GDRY	05/14/2009

**U.S.ENVIRONMENTAL PROTECTION AGENCY
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**SDG #0900021
SAMPLE ANALYSIS REPORT**

Sample #:	A9.02925H	QC batch #:	0005769H
Matrix:	SOIL	Assay batch #:	0013258V
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.530e-01 GASH	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	79.85 %	Analyst:	PMT
Ash/dry weight:	87.60 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/14/2009 17:05	1000.0	AS26	DPG

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	MDC	Unit	Date
U234	5.21e-01	1.1e-01	3.2e-02	PCI/GDRY	05/14/2009
U235	4.44e-02	3.8e-02	3.8e-02	PCI/GDRY	05/14/2009
U238	5.06e-01	1.1e-01	2.4e-02	PCI/GDRY	05/14/2009

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #0900021

SAMPLE ANALYSIS REPORT

Sample #:	LCS-00560089T	QC batch #:	0005769H
Matrix:	N/A	Assay batch #:	0013258V
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	LCS
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/14/2009 17:05	1000.0	AS29	DPG

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
U234	1.85e+00	1.6e-01	9.1e-03	PCI	05/14/2009
U235	1.32e-01	3.4e-02	8.3e-03	PCI	05/14/2009
U238	1.97e+00	1.7e-01	1.0e-02	PCI	05/14/2009

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #0900021

SAMPLE ANALYSIS REPORT

Sample #:	RBK-00560088R	QC batch #:	0005769H
Matrix:	N/A	Assay batch #:	0013258V
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	RBK
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/14/2009 17:05	1000.0	AS33	DPG

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
U234	1.62e-02	1.3e-02	1.6e-02	PCI	05/14/2009
U235	3.88e-03	8.4e-03	1.3e-02	PCI	05/14/2009
U238	7.13e-03	8.9e-03	1.1e-02	PCI	05/14/2009

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021
SAMPLE ANALYSIS REPORT**

Sample #:	LCS-00560984R	QC batch #:	0005792G
Matrix:	N/A	Assay batch #:	0013275W
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	LCS
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/20/2009 17:04	1000.0	AS09	DPG

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
U234	1.95e+00	1.8e-01	1.3e-02	PCI	05/20/2009
U235	1.07e-01	3.4e-02	1.0e-02	PCI	05/20/2009
U238	1.99e+00	1.8e-01	1.2e-02	PCI	05/20/2009

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021
SAMPLE ANALYSIS REPORT**

Sample #:	RBK-00560983Q	QC batch #:	0005792G
Matrix:	N/A	Assay batch #:	0013275W
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	RBK
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/20/2009 17:04	1000.0	AS10	DPG

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
U234	1.47e-02	1.4e-02	1.5e-02	PCI	05/20/2009
U235	1.56e-02	1.5e-02	1.3e-02	PCI	05/20/2009
U238	1.65e-02	1.5e-02	1.7e-02	PCI	05/20/2009

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG 0900021

QC BATCH SUMMARY

QC batch #: 0005769H
Preparation procedure: N/A
Analysis procedure: NAREL U-EICHROM

NAREL Sample #	QC Type	Yield (%)	± 2 σ Uncertainty (%)	Analyst
A9.02906E		105.00 %	7.76 %	PMT
A9.02906E	DUP	101.58 %	7.55 %	PMT
A9.02907F		102.12 %	7.58 %	PMT
A9.02921D		99.31 %	7.42 %	PMT
A9.02924G		97.83 %	7.26 %	PMT
A9.02925H		95.85 %	6.72 %	PMT
LCS-00560089T *	LCS	93.07 %	6.50 %	PMT
RBK-00560088R *	RBK	90.97 %	6.70 %	PMT

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG 0900021

QC BATCH SUMMARY

QC batch #: 0005792G
Preparation procedure: N/A
Analysis procedure: NAREL U-EICHROM

NAREL Sample #	QC Type	Yield (%)	± 2 σ Uncertainty (%)	Analyst
A9.02913D		94.25 %	6.63 %	PMT
A9.02913D	DUP	94.61 %	6.55 %	PMT
A9.02916G		96.15 %	6.67 %	PMT
LCS-00560984R *	LCS	100.35 %	7.48 %	PMT
RBK-00560983Q *	RBK	77.02 %	6.14 %	PMT

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory
QC Batch Report

QC Batch #: 0005769H

Analytical Procedure: NAREL U-EICHROM

METHOD BLANKS (PCI)

Sample ID	Nuclide	Activity $\pm 2\sigma$	Prep Date
00560088R	U234	1.62e-02 \pm 1.3e-02	2009-05-07
00560088R	U235	3.88e-03 \pm 8.4e-03	2009-05-07
00560088R	U238	7.13e-03 \pm 8.9e-03	2009-05-07

LABORATORY DUPLICATES (PCI/GASH)

Sample ID	Nuclide	Original $\pm 2\sigma$	Duplicate $\pm 2\sigma$	RPD	Z
A9.02906E	U234	7.59e-01 \pm 1.6e-01	8.10e-01 \pm 1.7e-01	6.54	0.44 OK
A9.02906E	U235	5.74e-02 \pm 5.3e-02	4.77e-02 \pm 4.7e-02	18.37	-0.27 OK
A9.02906E	U238	8.24e-01 \pm 1.7e-01	7.78e-01 \pm 1.7e-01	5.76	-0.39 OK

LAB CONTROL SAMPLES (PCI)

Sample ID	Nuclide	Amt Added $\pm 2\sigma$	Measured $\pm 2\sigma$	%R	Z
00560089T	U234	1.96e+00 \pm 2.8%	1.85e+00 \pm 1.6e-01	94.13	-1.38 OK
00560089T	U235	9.38e-02 \pm 2.6%	1.32e-01 \pm 3.4e-02	140.76	2.09 OK
00560089T	U238	2.04e+00 \pm 2.8%	1.97e+00 \pm 1.7e-01	96.44	-0.83 OK

Analyst:

Paul Thaxton

5/18/09

QA Officer:

Karen S McLean

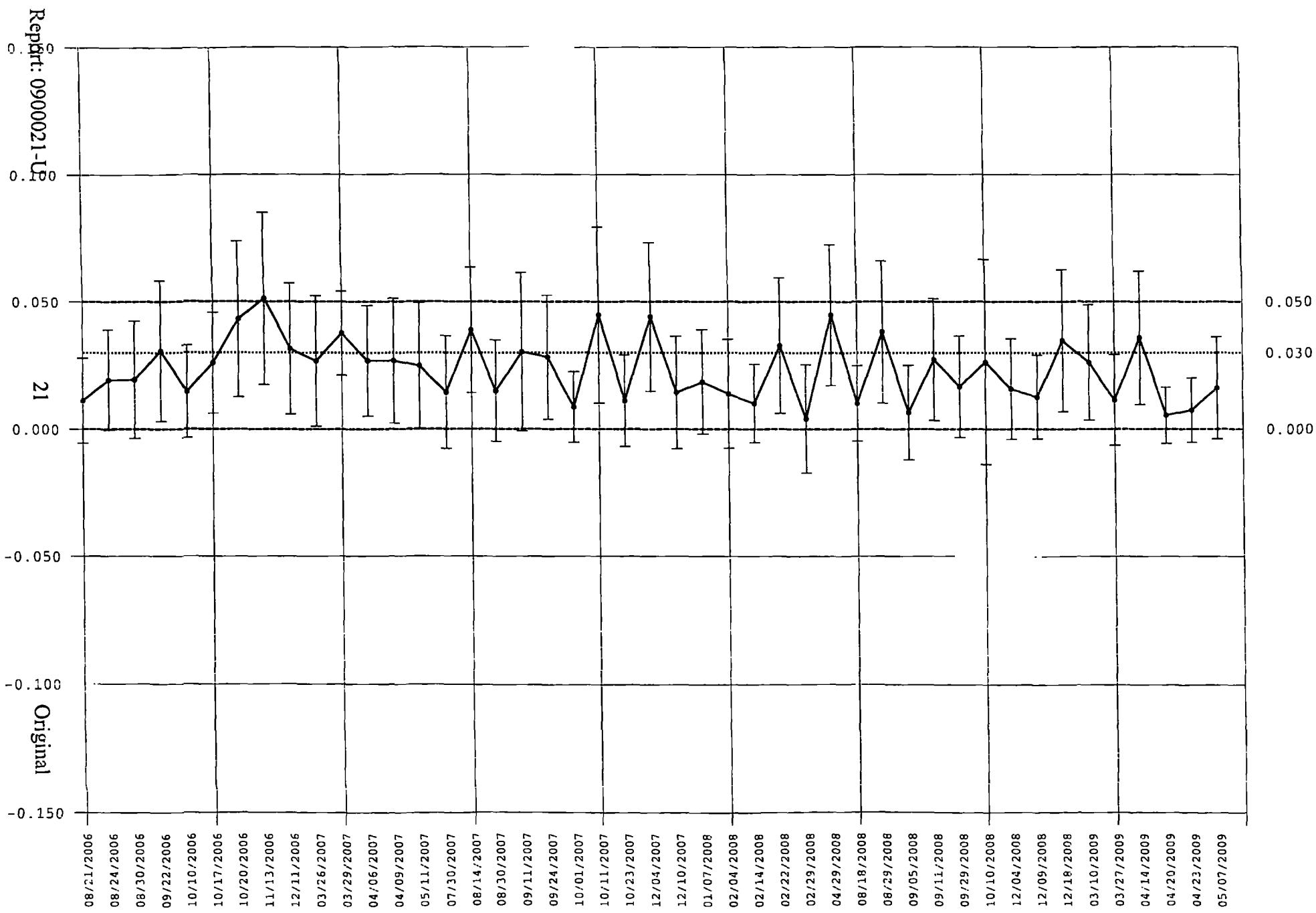
5/19/09

Method Blanks

Analyte: U234

Procedure: NAREL U-EICHROM

Analyst: Thaxton, Paula M.

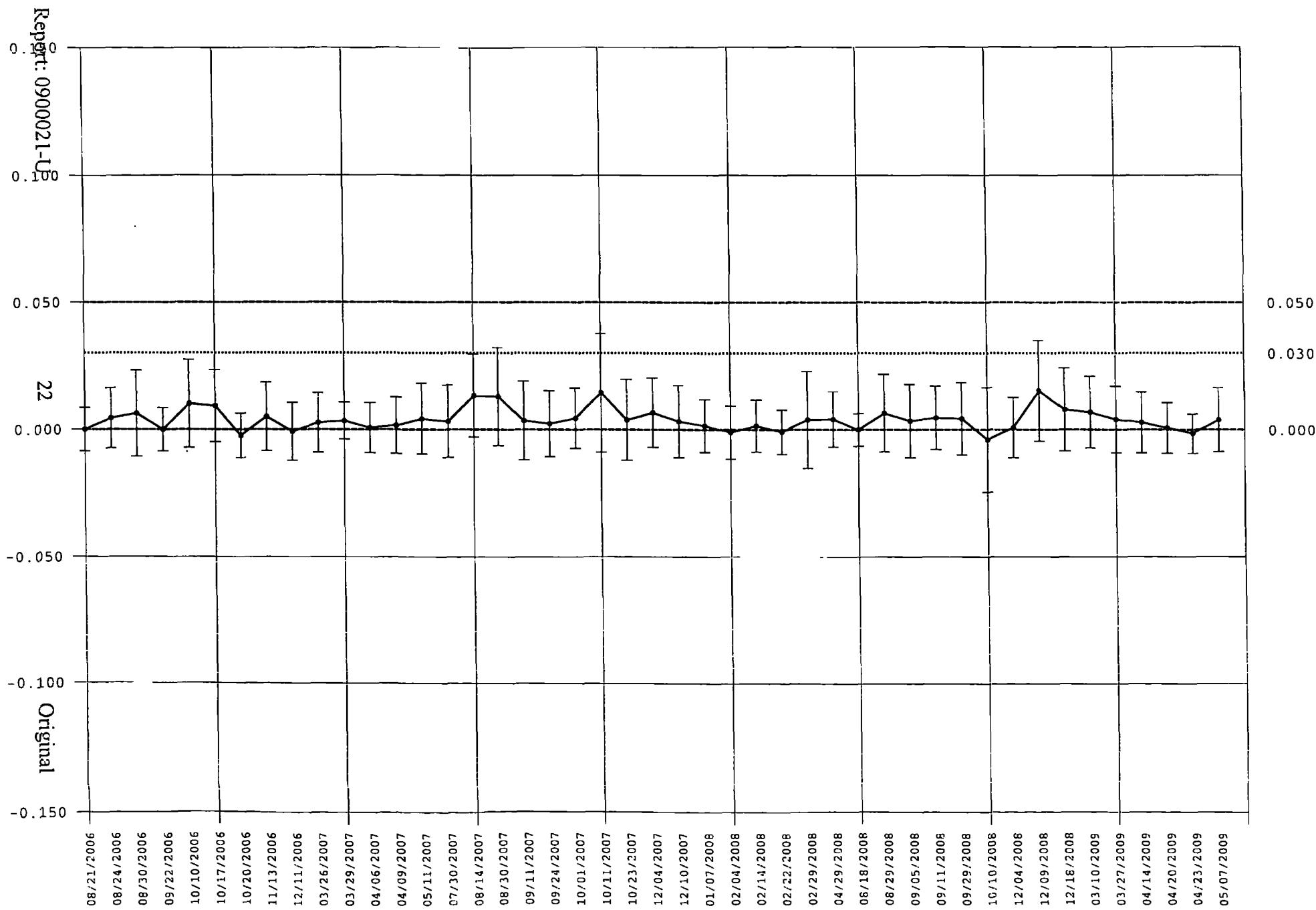


Method Blanks

Analyte: U235

Procedure: NAREL U-EICHROM

Analyst: Thaxton, Paula M.

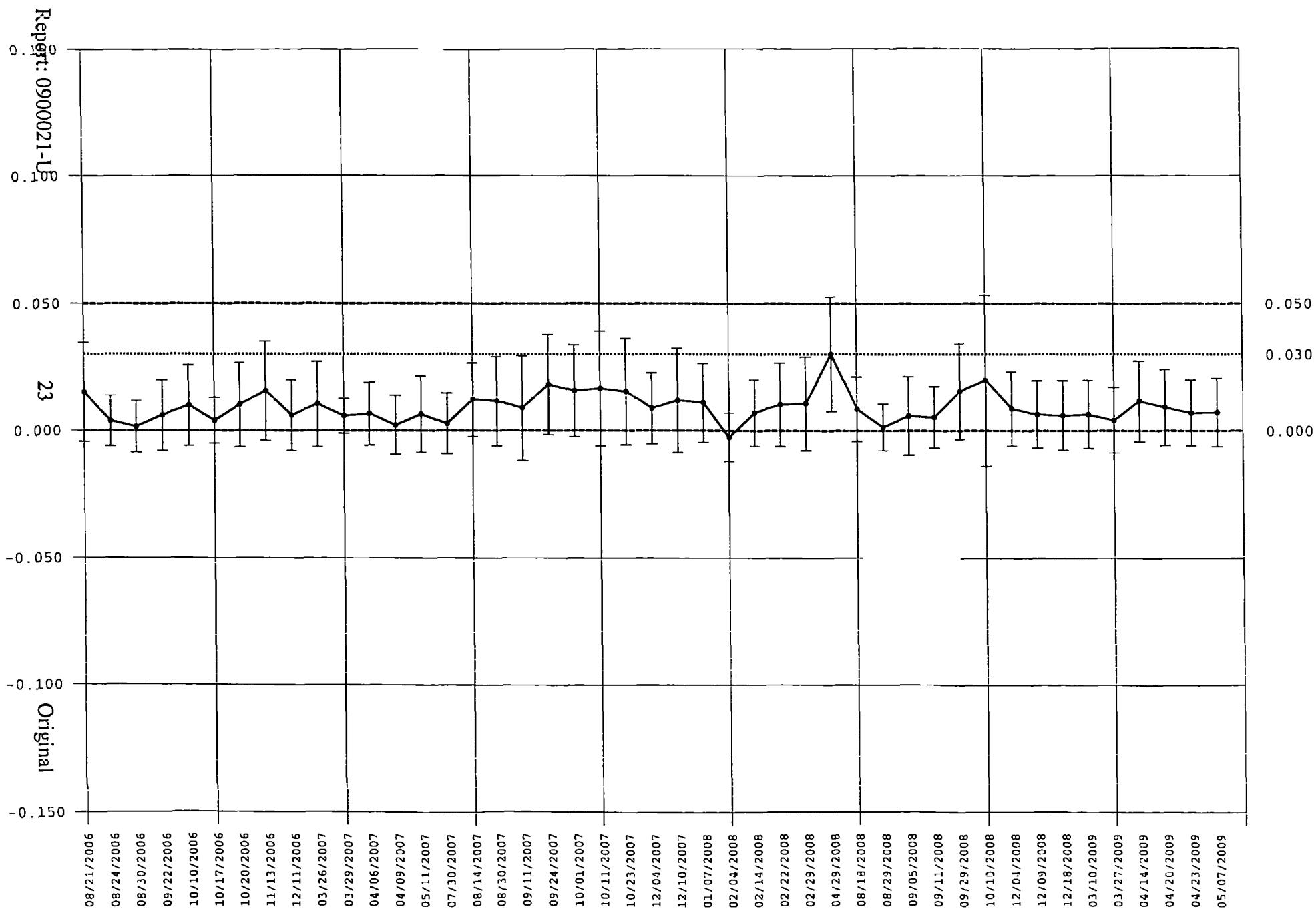


Method Blanks

Analyte: U238

Procedure: NAREL U-EICHROM

Analyst: Thaxton, Paula M.



National Air and Radiation Environmental Laboratory
QC Batch Report

QC Batch #: 0005792G

Analytical Procedure: NAREL U-EICHROM

METHOD BLANKS (PCI)

Sample ID	Nuclide	Activity $\pm 2\sigma$	Prep Date
00560983Q	U234	1.47e-02 \pm 1.4e-02	2009-05-19
00560983Q	U235	1.56e-02 \pm 1.5e-02	2009-05-19
00560983Q	U238	1.65e-02 \pm 1.5e-02	2009-05-19

LABORATORY DUPLICATES (PCI/GASH)

Sample ID	Nuclide	Original $\pm 2\sigma$	Duplicate $\pm 2\sigma$	RPD	Z
A9.02913D	U234	1.07e+00 \pm 2.2e-01	1.20e+00 \pm 2.3e-01	11.74	0.83 OK
A9.02913D	U235	3.56e-02 \pm 4.5e-02	1.00e-01 \pm 6.5e-02	95.39	1.64 OK
A9.02913D	U238	1.05e+00 \pm 2.2e-01	1.10e+00 \pm 2.2e-01	5.41	0.37 OK

LAB CONTROL SAMPLES (PCI)

Sample ID	Nuclide	Amt Added $\pm 2\sigma$	Measured $\pm 2\sigma$	%R	Z
00560984R	U234	1.96e+00 \pm 2.8%	1.95e+00 \pm 1.8e-01	99.29	-0.15 OK
00560984R	U235	9.38e-02 \pm 2.6%	1.07e-01 \pm 3.4e-02	113.69	0.72 OK
00560984R	U238	2.04e+00 \pm 2.8%	1.99e+00 \pm 1.8e-01	97.56	-0.52 OK

Analyst:

Paula M. Thaxton 5/21/09

Thaxton, Paula M.

QA Officer:

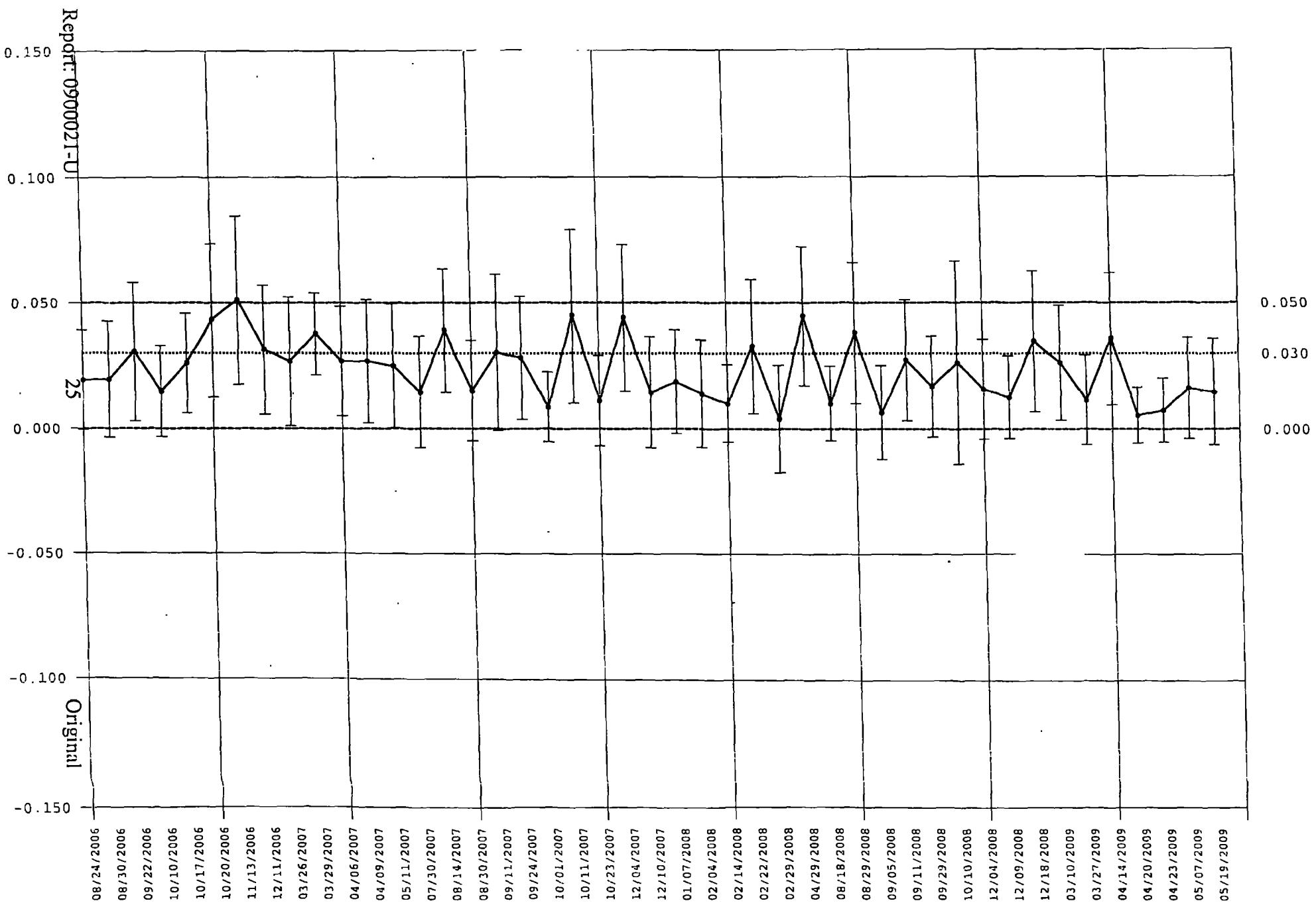
J. McTigue 5/21/09

Method Blanks

Analyte: U234

Procedure: NAREL U-EICHROM

Analyst: Thaxton, Paula M.

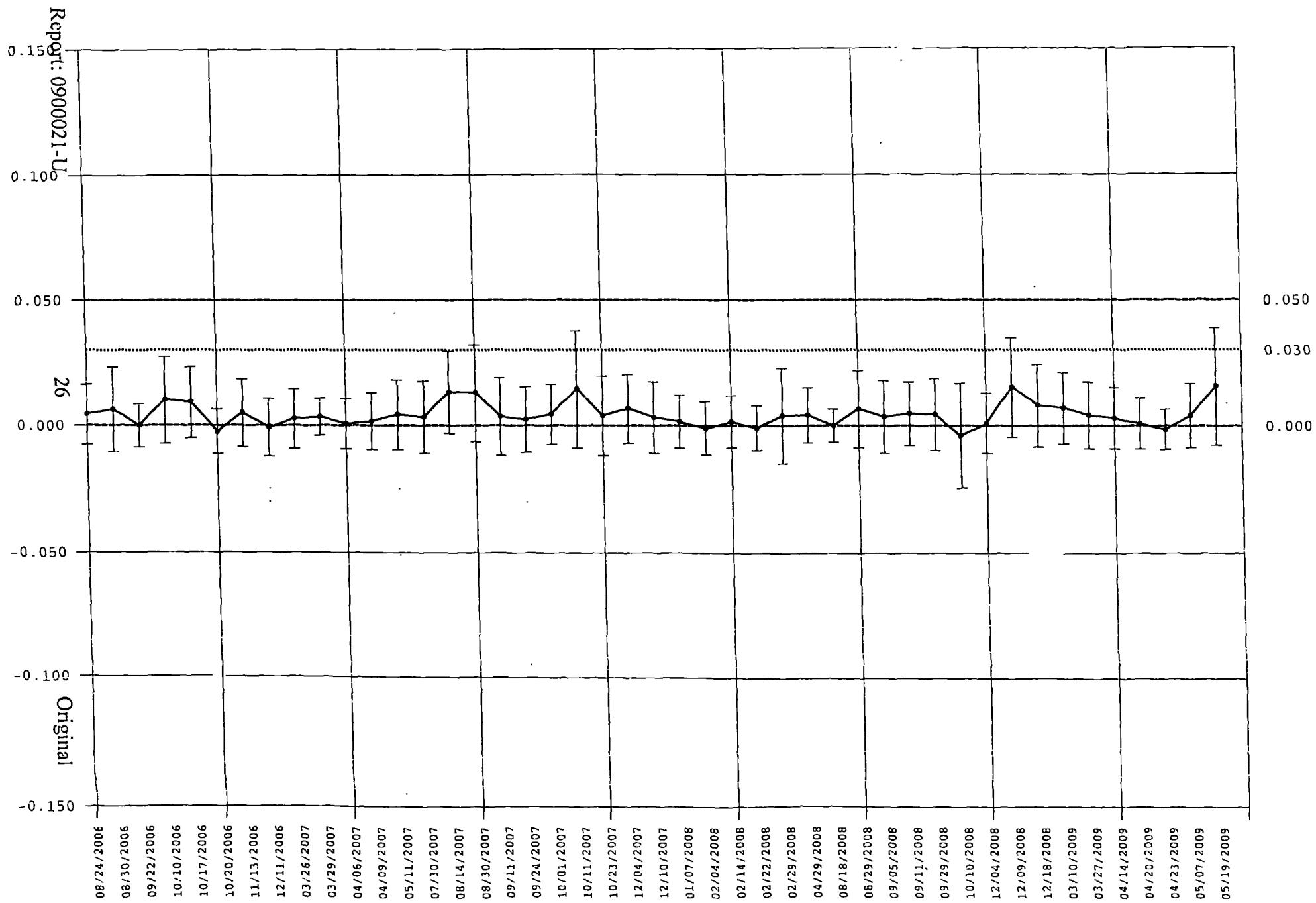


Method Blanks

Analyte: U235

Procedure: NAREL U-EICHROM

Analyst: Thaxton, Paula M.

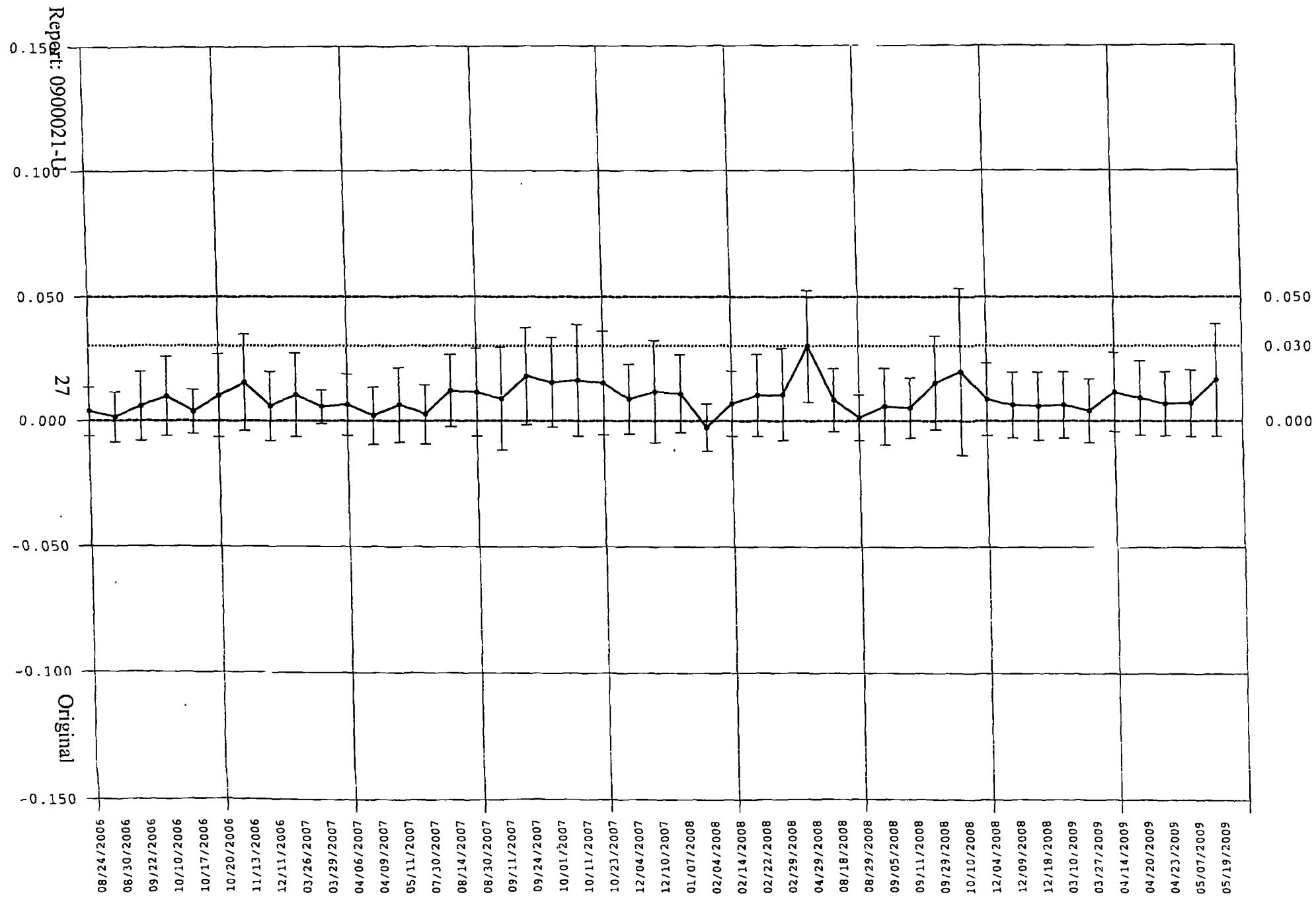


Method Blanks

Analyte: U238

Procedure: NAREL U-EICHROM

Analyst: Thaxton, Paula M.



**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
TH ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #0900021

Project: Region 7 - Kansas Radium Dial Site, Wichita, KS
 Analysis Procedure: Actinides (Thorium) by Extraction Chromatography
 Report ID: 0900021-TH
 Report Type: Original
 Date Reported: 05/27/2009
 Total Pages in Report: 29

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A9.02906E	650-SB-BG1 (2-3 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02907F	650-SB-BG2 (2-3 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02908G	650-SB-7-2 (0-1 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02909H	650-SB-10-1 (0-1 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02910A	650-SB-10-1 (1-2 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02911B	650-SB-13-1 (0-1 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02912C	650-SB-13-1 (1-2 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02913D	650-SB-13-2 (0-3.5 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02914E	650-SB-13-2 (3.5-4 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02915F	650-SB-13-3 (0-1 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02916G	650-SB-13-3 (1-2 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02917H	650-SB-13-3 (2-3 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02918J	650-SB-17-1 (0-3 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02919K	650-SB-17-1 (3-4 FT)	SAM	SOIL	03/26/2009	04/02/2009
A9.02920C	650-SS-9-1	SAM	SOIL	03/26/2009	04/02/2009
A9.02921D	650-SS-12-1	SAM	SOIL	03/26/2009	04/02/2009
A9.02922E	650-SS-23-1	SAM	SOIL	03/26/2009	04/02/2009
A9.02923F	650-SS-24-1	SAM	SOIL	03/26/2009	04/02/2009
A9.02924G	650-SS-BGA	SAM	SOIL	03/26/2009	04/02/2009
A9.02925H	650-SS-BGB	SAM	SOIL	03/26/2009	04/02/2009

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - Only samples A9.02906, A9.02907, A9.02913, A9.02916, A9.02921, A9.02924, and A9.02925 were analyzed for thorium as requested by the client. For samples A9.02913 and A9.02916, the aliquant size used for these samples was very small in anticipation of elevated analyte concentration. The concentration of thorium present in these samples, however, was not elevated as anticipated. In an effort to provide results with lower uncertainties, samples A9.02913 and A9.02916 were reanalyzed with larger aliquants. The results of the reanalysis of these samples are reported in this data package.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Yields - All chemical yields were within acceptance limits.
3. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

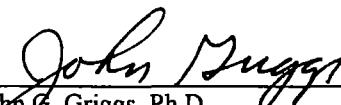
CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Director of the Center for Environmental Radioanalytical Laboratory Science and the NAREL Quality Assurance Manager, or their designees, as verified by the following signatures.



Mary F. Wisdom
Quality Assurance Manager, NAREL

5-28-09
Date



John G. Griggs, Ph.D.
Director, Center for Environmental Radioanalytical
Laboratory Science

5/28/09
Date

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Method blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A method blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #0900021

ANALYSIS SUMMARY

Analysis Procedure: NAREL TH-EICHROM
Title: Actinides (Thorium) by Extraction Chromatography

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Assay Batch #	QC Batch #
A9.02906E		N/A	05/14/2009	0013257U	0005768G
A9.02906E	DUP	N/A	05/14/2009	0013257U	0005768G
A9.02907F		N/A	05/14/2009	0013257U	0005768G
A9.02913D		N/A	05/21/2009	0013274V	0005791F
A9.02913D	DUP	N/A	05/21/2009	0013274V	0005791F
A9.02916G		N/A	05/21/2009	0013274V	0005791F
A9.02921D		N/A	05/14/2009	0013257U	0005768G
A9.02924G		N/A	05/14/2009	0013257U	0005768G
A9.02925H		N/A	05/14/2009	0013257U	0005768G
LCS-00560086P *	LCS	N/A	05/14/2009	0013257U	0005768G
RBK-00560085N *	RBK	N/A	05/14/2009	0013257U	0005768G
LCS-00560976R *	LCS	N/A	05/21/2009	0013274V	0005791F
RBK-00560974P *	RBK	N/A	05/21/2009	0013274V	0005791F

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

PREPARATION METHOD(S) USED

Procedure ID	Title

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #0900021

SAMPLE ANALYSIS REPORT

Sample #:	A9.02906E	QC batch #:	0005768G
Matrix:	SOIL	Assay batch #:	0013257U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.532e-01 GASH	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	82.52 %	Analyst:	PMT
Ash/dry weight:	95.20 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/13/2009 16:01	1000.0	AS29	DPG

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	MDC	Unit	Date
Th227	1.21e-01	8.2e-02	7.9e-02	PCI/GDRY	05/12/2009
Th228	1.34e+00	2.0e-01	8.3e-02	PCI/GDRY	05/12/2009
Th230	1.21e+00	1.9e-01	2.6e-02	PCI/GDRY	05/12/2009
Th232	1.24e+00	1.9e-01	4.3e-02	PCI/GDRY	05/12/2009

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #0900021

SAMPLE ANALYSIS REPORT

Sample #:	A9.02906E	QC batch #:	0005768G
Matrix:	SOIL	Assay batch #:	0013257U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.509e-01 GASH	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	82.52 %	Analyst:	PMT
Ash/dry weight:	95.20 %	QC type:	DUP
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/13/2009 16:01	1000.0	AS33	DPG

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	MDC	Unit	Date
Th227	6.16e-02	7.9e-02	1.2e-01	PCI/GDRY	05/12/2009
Th228	1.51e+00	2.4e-01	1.1e-01	PCI/GDRY	05/12/2009
Th230	1.29e+00	2.1e-01	5.1e-02	PCI/GDRY	05/12/2009
Th232	1.17e+00	2.0e-01	4.1e-02	PCI/GDRY	05/12/2009

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #0900021

SAMPLE ANALYSIS REPORT

Sample #:	A9.02907F	QC batch #:	0005768G
Matrix:	SOIL	Assay batch #:	0013257U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.537e-01 GASH	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	84.22 %	Analyst:	PMT
Ash/dry weight:	95.60 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/13/2009 16:01	1000.0	AS35	DPG

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Th227	2.95e-02	6.0e-02	1.0e-01	PCI/GDRY	05/12/2009
Th228	1.38e+00	2.2e-01	1.3e-01	PCI/GDRY	05/12/2009
Th230	1.10e+00	1.9e-01	5.3e-02	PCI/GDRY	05/12/2009
Th232	1.10e+00	1.9e-01	3.9e-02	PCI/GDRY	05/12/2009

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #0900021

SAMPLE ANALYSIS REPORT

Sample #:	A9.02913D	QC batch #:	0005791F
Matrix:	SOIL	Assay batch #:	0013274V
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.014e-01 GASH	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	84.24 %	Analyst:	PMT
Ash/dry weight:	94.80 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/20/2009 16:52	1000.0	AS06	DPG

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	MDC	Unit	Date
Th227	8.08e-02	1.0e-01	1.6e-01	PCI/GDRY	05/20/2009
Th228	5.41e-01	1.8e-01	1.6e-01	PCI/GDRY	05/20/2009
Th230	1.03e+00	2.4e-01	6.9e-02	PCI/GDRY	05/20/2009
Th232	5.58e-01	1.7e-01	6.0e-02	PCI/GDRY	05/20/2009

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #0900021

SAMPLE ANALYSIS REPORT

Sample #:	A9.02913D	QC batch #:	0005791F
Matrix:	SOIL	Assay batch #:	0013274V
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.014e-01 GASH	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	84.24 %	Analyst:	PMT
Ash/dry weight:	94.80 %	QC type:	DUP
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/20/2009 16:56	1000.0	AS07	DPG

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	1.05e-01	1.2e-01	1.6e-01	PCI/GDRY	05/20/2009
Th228	4.89e-01	1.9e-01	2.1e-01	PCI/GDRY	05/20/2009
Th230	9.76e-01	2.4e-01	9.2e-02	PCI/GDRY	05/20/2009
Th232	6.10e-01	1.8e-01	7.3e-02	PCI/GDRY	05/20/2009

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #0900021

SAMPLE ANALYSIS REPORT

Sample #:	A9.02916G	QC batch #:	0005791F
Matrix:	SOIL	Assay batch #:	0013274V
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.508e-01 GASH	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	82.50 %	Analyst:	PMT
Ash/dry weight:	90.40 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/20/2009 16:56	1000.0	AS08	DPG

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	6.53e-02	7.3e-02	1.1e-01	PCI/GDRY	05/20/2009
Th228	9.84e-01	1.9e-01	1.0e-01	PCI/GDRY	05/20/2009
Th230	1.29e+00	2.3e-01	3.5e-02	PCI/GDRY	05/20/2009
Th232	8.66e-01	1.7e-01	4.7e-02	PCI/GDRY	05/20/2009

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021
SAMPLE ANALYSIS REPORT**

Sample #:	A9.02921D	QC batch #:	0005768G
Matrix:	SOIL	Assay batch #:	0013257U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.545e-01 GASH	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	91.74 %	Analyst:	PMT
Ash/dry weight:	96.00 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/13/2009 16:01	1000.0	AS36	DPG

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	7.11e-02	7.9e-02	1.1e-01	PCI/GDRY	05/12/2009
Th228	7.87e-01	1.7e-01	1.2e-01	PCI/GDRY	05/12/2009
Th230	7.48e-01	1.5e-01	3.9e-02	PCI/GDRY	05/12/2009
Th232	8.28e-01	1.6e-01	5.2e-02	PCI/GDRY	05/12/2009

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #0900021

SAMPLE ANALYSIS REPORT

Sample #:	A9.02924G	QC batch #:	0005768G
Matrix:	SOIL	Assay batch #:	0013257U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.527e-01 GASH	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	86.84 %	Analyst:	PMT
Ash/dry weight:	91.60 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/13/2009 16:01	1000.0	AS37	DPG

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Th227	1.30e-02	6.4e-02	1.3e-01	PCI/GDRY	05/12/2009
Th228	7.17e-01	1.6e-01	1.2e-01	PCI/GDRY	05/12/2009
Th230	6.00e-01	1.4e-01	4.6e-02	PCI/GDRY	05/12/2009
Th232	8.17e-01	1.6e-01	4.6e-02	PCI/GDRY	05/12/2009

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021
SAMPLE ANALYSIS REPORT**

Sample #:	A9.02925H	QC batch #:	0005768G
Matrix:	SOIL	Assay batch #:	0013257U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.530e-01 GASH	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	79.85 %	Analyst:	PMT
Ash/dry weight:	87.60 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/13/2009 16:01	1000.0	AS38	DPG

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	4.15e-02	7.1e-02	1.2e-01	PCI/GDRY	05/12/2009
Th228	8.42e-01	1.7e-01	1.1e-01	PCI/GDRY	05/12/2009
Th230	5.44e-01	1.3e-01	4.8e-02	PCI/GDRY	05/12/2009
Th232	5.61e-01	1.3e-01	6.1e-02	PCI/GDRY	05/12/2009

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #0900021

SAMPLE ANALYSIS REPORT

Sample #:	LCS-00560086P	QC batch #:	0005768G
Matrix:	N/A	Assay batch #:	0013257U
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	LCS
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/13/2009 16:01	1000.0	AS39	DPG

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	-2.23e-03	1.1e-02	2.8e-02	PCI	05/12/2009
Th228	2.40e-02	1.9e-02	2.8e-02	PCI	05/12/2009
Th230	2.33e+00	2.0e-01	1.0e-02	PCI	05/12/2009
Th232	1.68e-02	1.2e-02	1.2e-02	PCI	05/12/2009

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDC #0900021

SAMPLE ANALYSIS REPORT

Sample #:	RBK-00560085N	QC batch #:	0005768G
Matrix:	N/A	Assay batch #:	0013257U
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	RBK
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/13/2009 16:01	1000.0	AS40	DPG

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	MDC	Unit	Date
Th227	-1.13e-03	1.1e-02	2.6e-02	PCI	05/12/2009
Th228	2.06e-02	1.8e-02	2.7e-02	PCI	05/12/2009
Th230	7.29e-03	9.3e-03	1.3e-02	PCI	05/12/2009
Th232	1.03e-02	9.8e-03	1.0e-02	PCI	05/12/2009

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021
SAMPLE ANALYSIS REPORT**

Sample #:	LCS-00560976R	QC batch #:	0005791F
Matrix:	N/A	Assay batch #:	0013274V
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	LCS
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/20/2009 16:52	1000.0	AS21	DPG

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	MDC	Unit	Date
Th227	2.21e-03	1.5e-02	3.0e-02	PCI	05/20/2009
Th228	3.09e-03	1.8e-02	3.4e-02	PCI	05/20/2009
Th230	2.30e+00	2.0e-01	1.2e-02	PCI	05/20/2009
Th232	8.03e-03	9.3e-03	1.2e-02	PCI	05/20/2009

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #0900021
SAMPLE ANALYSIS REPORT**

Sample #:	RBK-00560974P	QC batch #:	0005791F
Matrix:	N/A	Assay batch #:	0013274V
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	RBK
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
05/20/2009 16:52	1000.0	AS24	DPG

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	MDC	Unit	Date
Th227	3.71e-03	1.6e-02	3.2e-02	PCI	05/20/2009
Th228	2.21e-02	2.2e-02	3.3e-02	PCI	05/20/2009
Th230	6.22e-03	8.4e-03	9.0e-03	PCI	05/20/2009
Th232	-6.90e-04	4.6e-03	1.2e-02	PCI	05/20/2009

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG 0900021

QC BATCH SUMMARY

QC batch #: 0005768G
Preparation procedure: N/A
Analysis procedure: NAREL TH-EICHROM

NAREL Sample #	QC Type	Yield (%)	± 2 σ Uncertainty (%)	Analyst
A9.02906E		94.35 %	5.15 %	PMT
A9.02906E	DUP	94.52 %	5.21 %	PMT
A9.02907F		96.42 %	5.28 %	PMT
A9.02921D		94.89 %	5.22 %	PMT
A9.02924G		93.68 %	5.17 %	PMT
A9.02925H		93.81 %	5.13 %	PMT
LCS-00560086P *	LCS	95.84 %	5.26 %	PMT
RBK-00560085N *	RBK	94.50 %	5.15 %	PMT

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG 0900021

QC BATCH SUMMARY

QC batch #: 0005791F
Preparation procedure: N/A
Analysis procedure: NAREL TH-EICHROM

NAREL Sample #	QC Type	Yield (%)	± 2 σ Uncertainty (%)	Analyst
A9.02913D		92.38 %	5.70 %	PMT
A9.02913D	DUP	87.72 %	5.42 %	PMT
A9.02916G		99.01 %	6.01 %	PMT
LCS-00560976R *	LCS	100.55 %	6.04 %	PMT
RBK-00560974P *	RBK	93.37 %	5.75 %	PMT

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory
QC Batch Report

QC Batch #: 0005768G

Analytical Procedure: NAREL TH-EICHROM

METHOD BLANKS (PCI)

Sample ID	Nuclide	Activity $\pm 2\sigma$	Prep Date
00560085N	TH227	-1.13e-03 \pm 1.1e-02	2009-05-07
00560085N	TH228	2.06e-02 \pm 1.8e-02	2009-05-07
00560085N	TH230	7.29e-03 \pm 9.3e-03	2009-05-07
00560085N	TH232	1.03e-02 \pm 9.8e-03	2009-05-07

LABORATORY DUPLICATES (PCI/GASH)

Sample ID	Nuclide	Original $\pm 2\sigma$	Duplicate $\pm 2\sigma$	RFD	Z
A9.02906E	TH227	1.27e-01 \pm 8.6e-02	6.47e-02 \pm 8.3e-02	65.14	-1.05 OK
A9.02906E	TH228	1.40e+00 \pm 2.1e-01	1.58e+00 \pm 2.5e-01	12.17	1.11 OK
A9.02906E	TH230	1.27e+00 \pm 2.0e-01	1.35e+00 \pm 2.2e-01	6.18	0.55 OK
A9.02906E	TH232	1.30e+00 \pm 2.0e-01	1.23e+00 \pm 2.1e-01	5.70	-0.50 OK

LAB CONTROL SAMPLES (PCI)

Sample ID	Nuclide	Amt Added $\pm 2\sigma$	Measured $\pm 2\sigma$	%R	Z
00560086P	TH227	NO SPIKE DATA			
00560086P	TH228	NO SPIKE DATA			
00560086P	TH230	2.49e+00 \pm 2.8%	2.33e+00 \pm 2.0e-01	93.92	-1.43 OK
00560086P	TH232	NO SPIKE DATA			

Analyst:

Paul Thaxton 5/18/09
Thaxton, Paul M.

QA Officer:

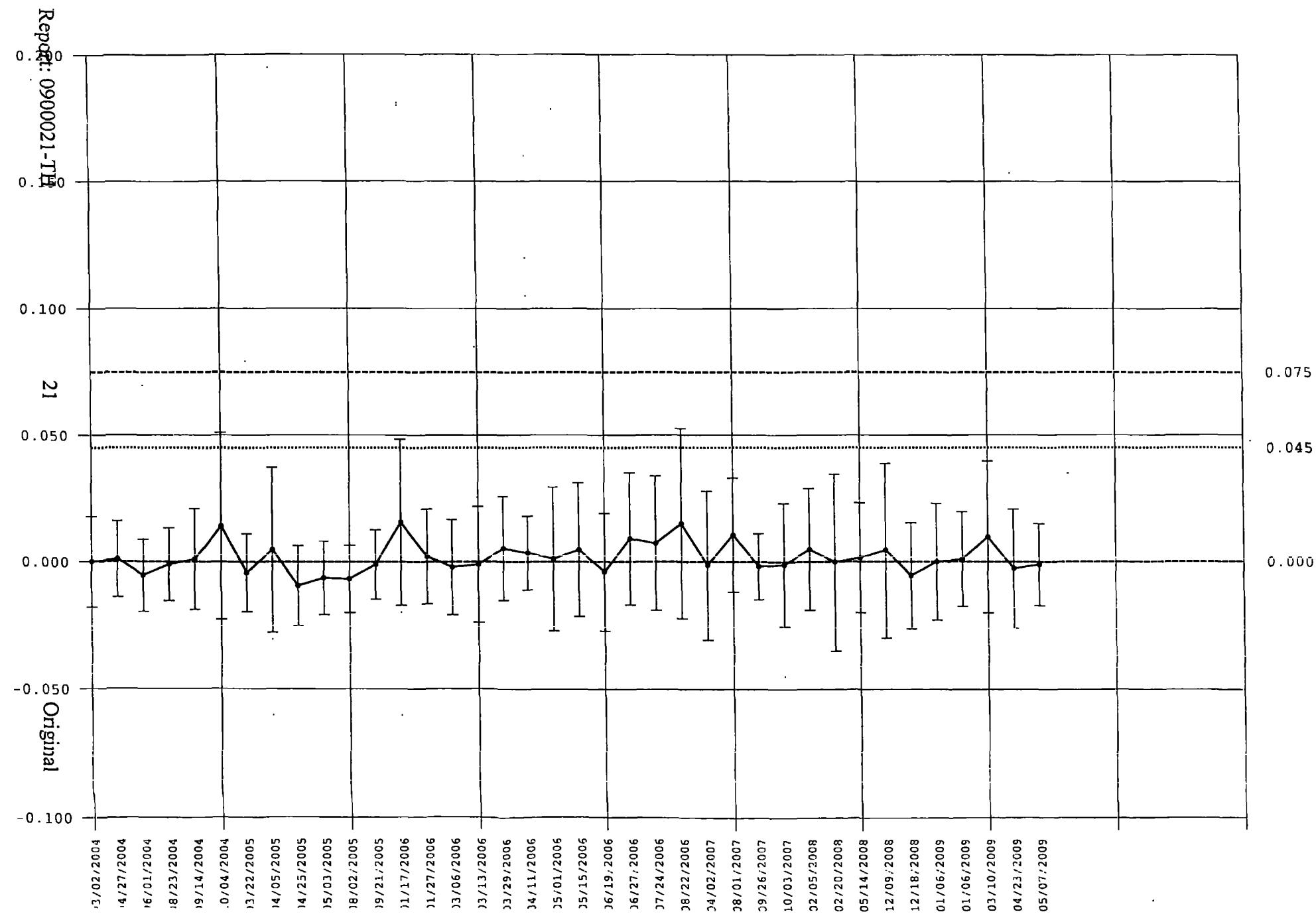
Kirk J. McLean 5/19/09

Method Blanks

Analyte: TH227

Procedure: NAREL TH-EICHROM

Analyst: Thaxton, Paula M.

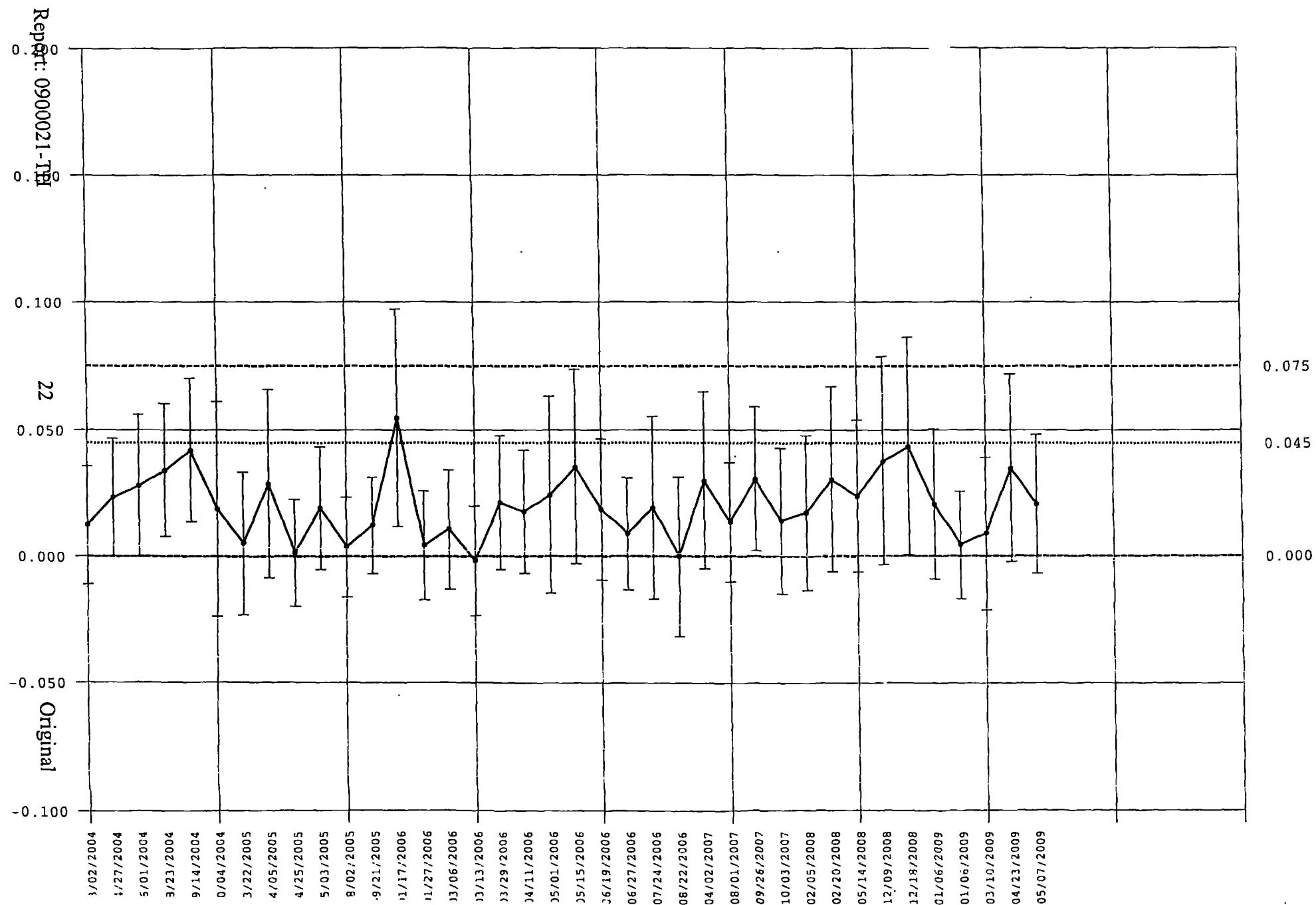


Method Blanks

Analyte: TH228

Procedure: NAREL TH-EICHROM

Analyst: Thaxton, Paula M.

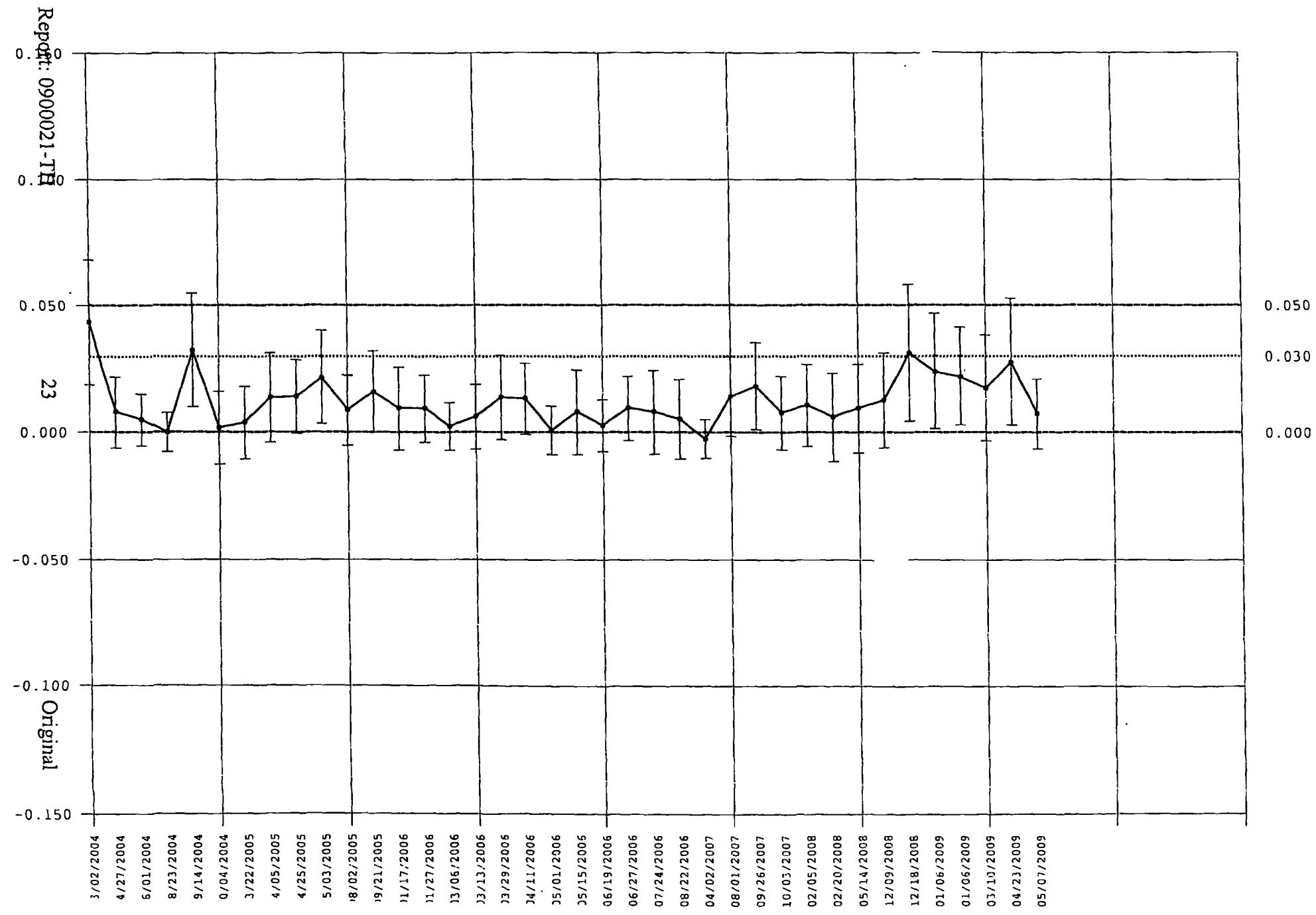


Method Blanks

Analyte: TH230

Procedure: NAREL TH-EICHROM

Analyst: Thaxton, Paula M.

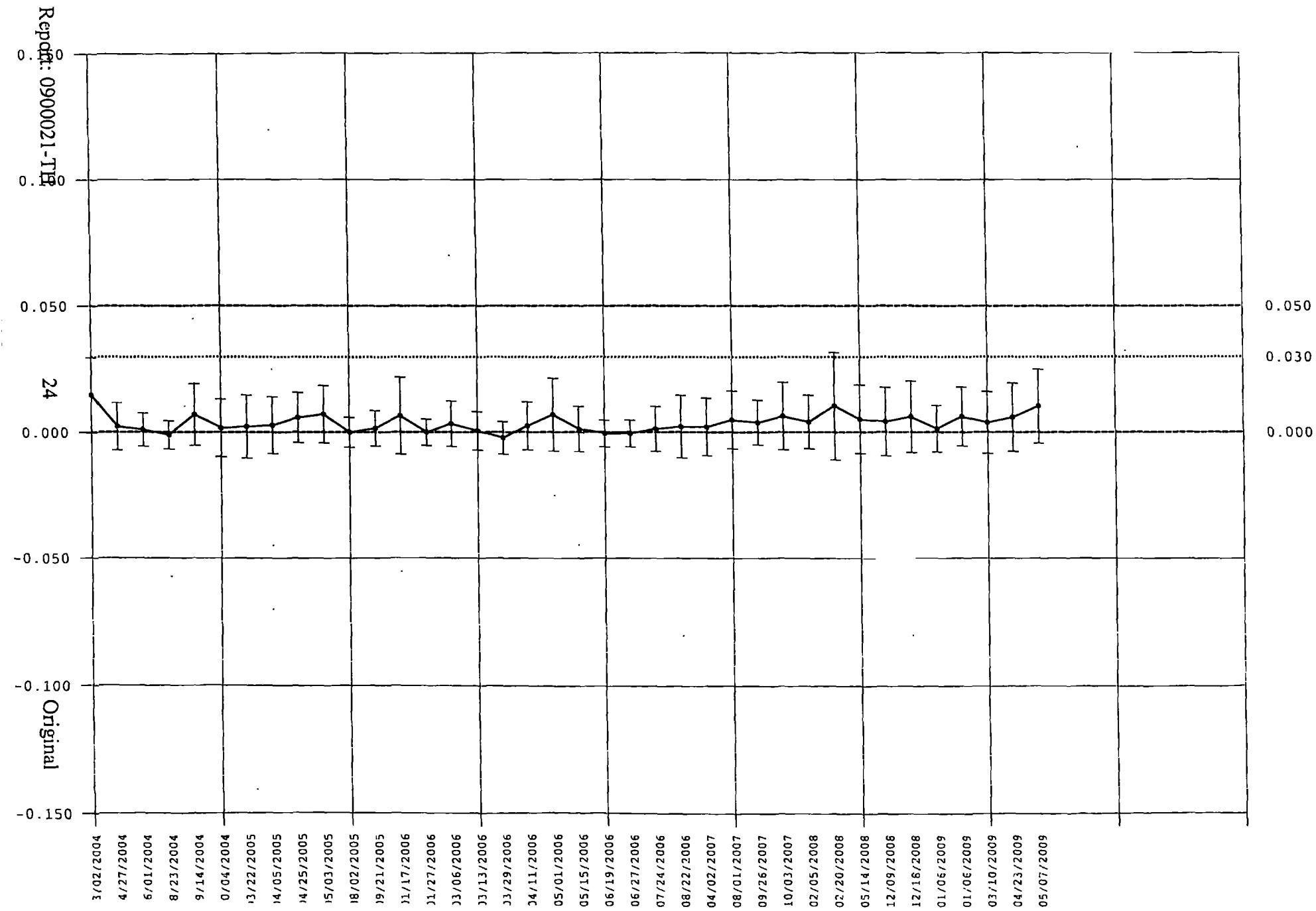


Method Blanks

Analyte: TH232

Procedure: NAREL TH-EICHROM

Analyst: Thaxton, Paula M.



National Air and Radiation Environmental Laboratory
QC Batch Report

QC Batch #: 0005791F

Analytical Procedure: NAREL TH-EICHROM

METHOD BLANKS (PCI)

Sample ID	Nuclide	Activity $\pm 2\sigma$	Prep Date
00560974P	TH227	3.71e-03 \pm 1.6e-02	2009-05-19
00560974P	TH228	2.21e-02 \pm 2.2e-02	2009-05-19
00560974P	TH230	6.22e-03 \pm 8.4e-03	2009-05-19
00560974P	TH232	-6.90e-04 \pm 4.6e-03	2009-05-19

LABORATORY DUPLICATES (PCI/GASH)

Sample ID	Nuclide	Original $\pm 2\sigma$	Duplicate $\pm 2\sigma$	RPD	Z
A9.02913D	TH227	8.52e-02 \pm 1.1e-01	1.11e-01 \pm 1.2e-01	26.52	0.32 OK
A9.02913D	TH228	5.71e-01 \pm 1.9e-01	5.16e-01 \pm 2.0e-01	10.04	-0.39 OK
A9.02913D	TH230	1.09e+00 \pm 2.5e-01	1.03e+00 \pm 2.5e-01	5.83	-0.34 OK
A9.02913D	TH232	5.89e-01 \pm 1.8e-01	6.44e-01 \pm 1.9e-01	8.95	0.42 OK

LAB CONTROL SAMPLES (PCI)

Sample ID	Nuclide	Amt Added $\pm 2\sigma$	Measured $\pm 2\sigma$	%R	Z
00560976R	TH227	NO SPIKE DATA			
00560976R	TH228	NO SPIKE DATA			
00560976R	TH230	2.49e+00 \pm 2.8%			
00560976R	TH232	NO SPIKE DATA	2.30e+00 \pm 2.0e-01	92.57	-1.72 OK

Analyst:

Paula M. Thaxton 5/21/09
Thaxton, Paula M.

QA Officer:

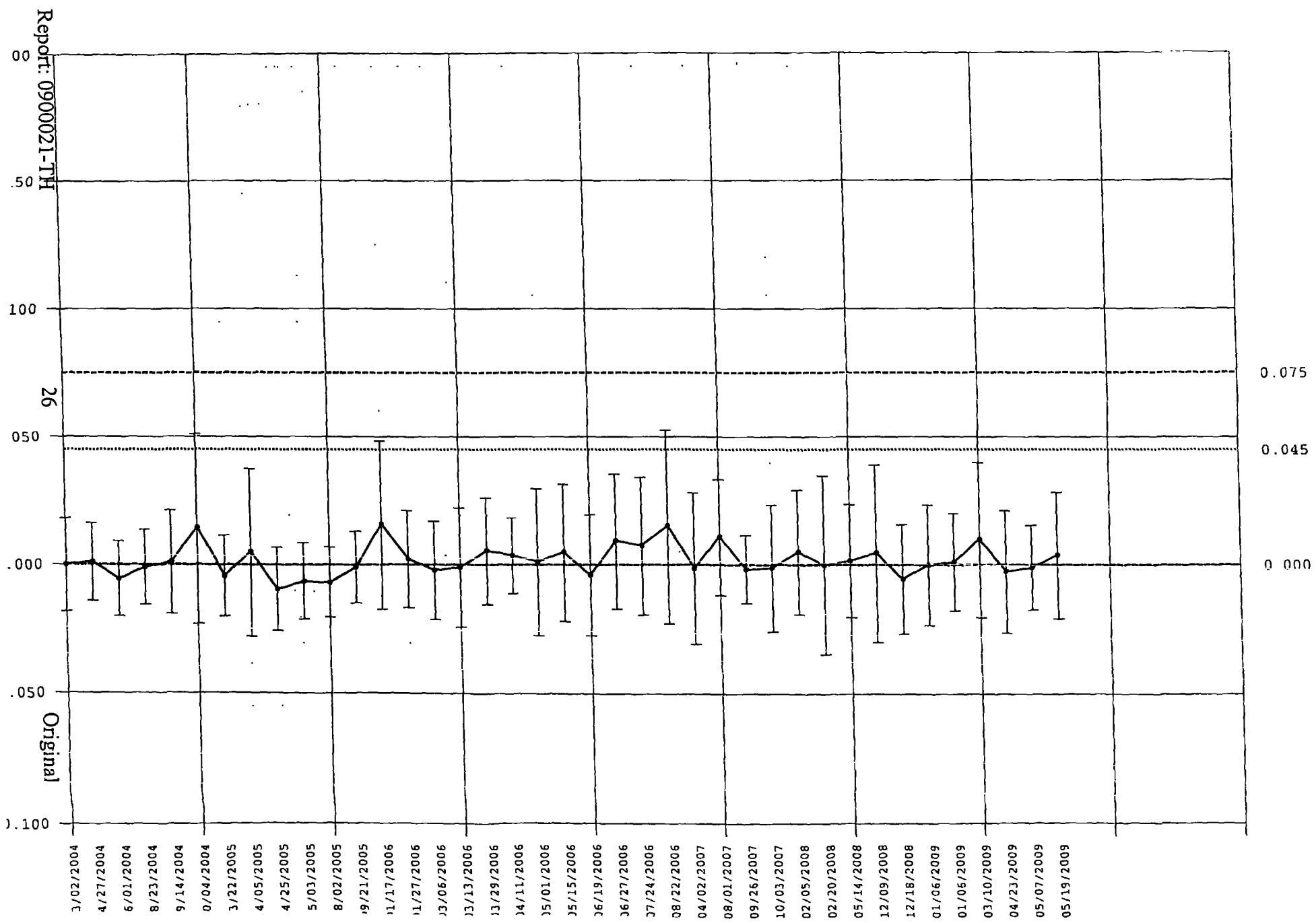
Karen J. McLean 5/21/09

Method Blanks

Analyte: TH227

Procedure: NAREL TH-EICHROM

Analyst: Thaxton, Paula M.



Method Blanks

Analyte: TH228

Procedure: NAREL TH-EICHROM

Analyst: Thaxton, Paula M.

Report:

0600021-TH

00

50

100

150

200

Original

0.075

0.045

0.000

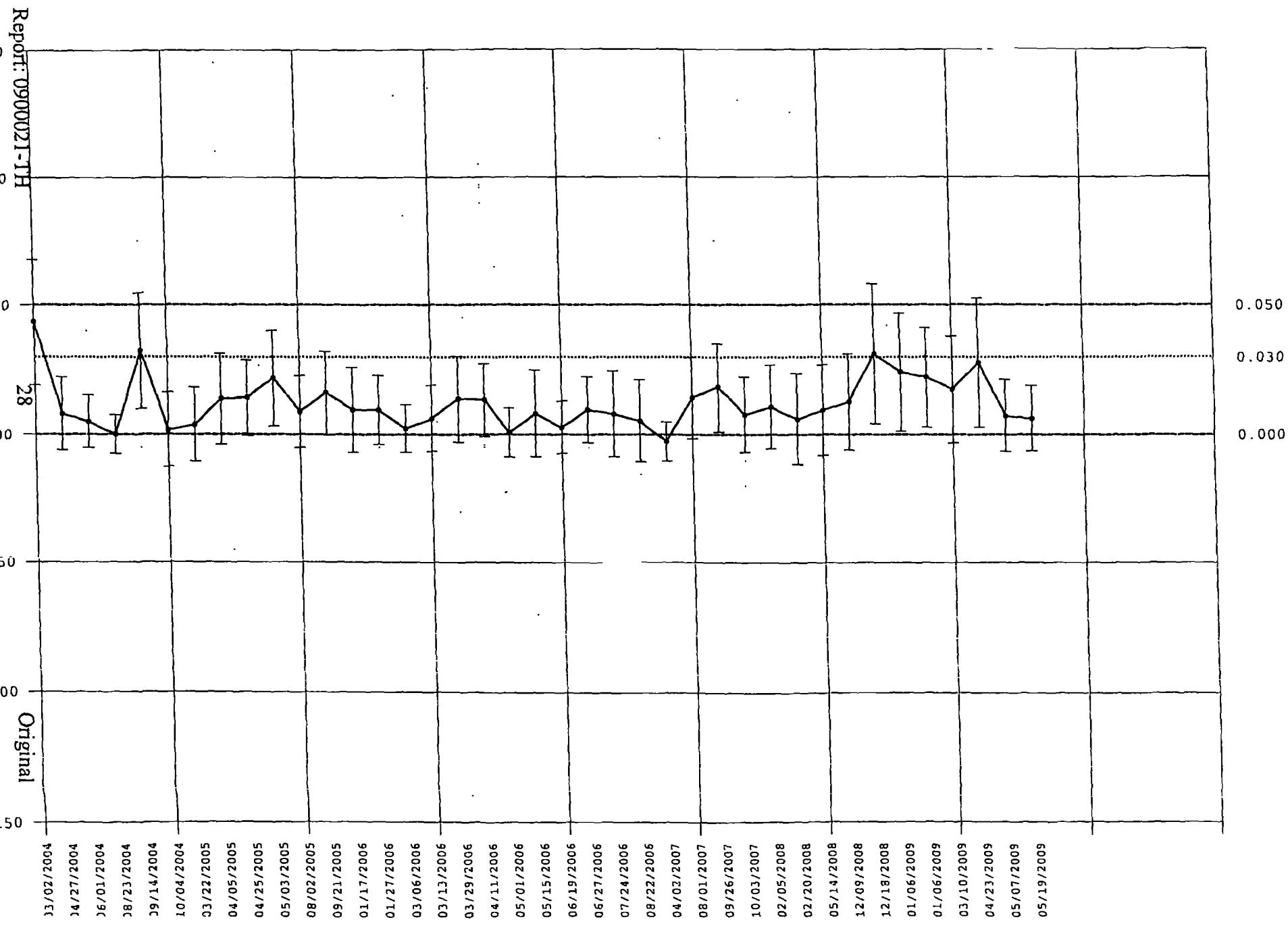
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Method Blanks

Analyte: TH230

Procedure: NAREL TH-EICHROM

Analyst: Thaxton, Paula M.



Method Blanks

Analyte: TH232

Procedure: NAREL TH-EICHROM

Analyst: Thaxton, Paula M.

Report:

